THE EFFECTS OF LONG DURATION BED REST ON FUNCTIONAL MOBILITY AND BALANCE: RELATIONSHIP TO RESTING STATE MOTOR CORTEX CONNECTIVITY

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Abstract
NASA offers researchers from a variety of backgrounds the opportunity to study bed rest as an experimental analog for space flight. Extended exposure to a head-down tilt position during long duration bed rest can resemble many of the effects of a low-gravity environment such as reduced sensory inputs, body unloading and increased cephalic fluid distribution. The aim of our study is to a) identify changes in brain function that occur with prolonged bed rest and characterize their recovery time course; b) assess whether and how these changes impact behavioral and neurocognitive performance. Thus far, we completed data collection from six participants that include task based and resting state fMRI. The data have been acquired through the bed rest facility located at the University of Texas Medical Branch (Galveston, TX). Subjects remained in bed with their heads tilted down 6 degrees below their feet for 70 consecutive days. Behavioral measures and neuroimaging assessments were obtained at seven time points: a) 7 and 12 days before bed rest; b) 7, 30, and 65 days during bed rest; and c) 7 and 12 days after bed rest. Functional connectivity magnetic resonance imaging (FcMRI) analysis was performed to assess the connectivity of motor cortex in and out of bed rest. We found a decrease in motor cortex connectivity with vestibular cortex and the cerebellum from pre bed rest to in bed rest. We also used a battery of behavioral measures including the functional mobility test and computerized dynamic posturography collected before and after bed rest. We will report the preliminary results of analyses relating brain and behavior changes. Furthermore, we will also report the preliminary results of a spatial working memory task and vestibular stimulation during in and out of bed rest.

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